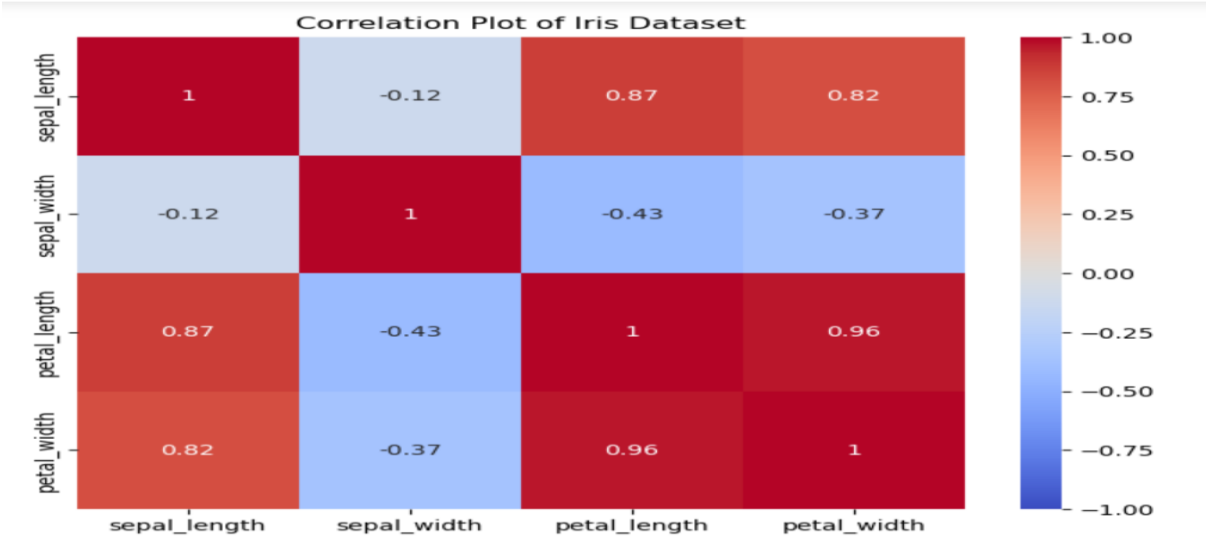
Q.1) Write a program to Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data.

```
import seaborn as sns
import matplotlib.pyplot as plt

# Load the iris dataset
iris = sns.load_dataset("iris")

# Calculate the correlation matrix
corr = iris.corr()

# Plot the heatmap
plt.figure(figsize=(10, 8))  # Set the size of the figure
sns.heatmap(corr, annot=True, cmap='coolwarm', vmin=-1, vmax=1)

# Display the plot
plt.title("Correlation Plot of Iris Dataset")
plt.show()
```

Output:



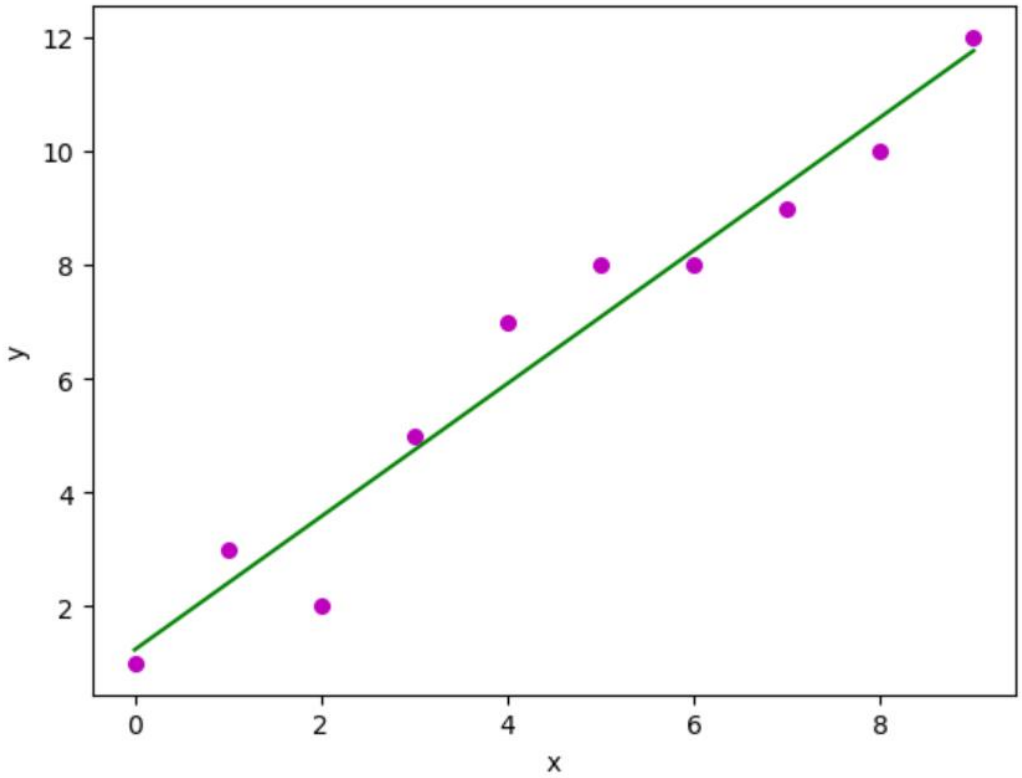
Q2) Write a program to implement linear regression algorithm to create and evaluate a model on a given dataset

```
import numpy as np
import matplotlib.pyplot as plt

def estimate_coef(x, y):
    # number of observations/points
    n = np.size(x)

    # mean of x and y vector
    m_x = np.mean(x)
    m_y = np.mean(y)

    # calculating cross-deviation and deviation about x
    SS_xy = np.sum(y*x) - n*m_y*m_x
    SS_xx = np.sum(x*x) - n*m_x*m_x

    # calculating regression coefficients
    b_1 = SS_xy / SS_xx
    b_0 = m_y - b_1*m_x

    return (b_0, b_1)

def plot_regression_line(x, y, b):
    # plotting the actual points as scatter plot
    plt.scatter(x, y, color = "m",
            marker = "o", s = 30)

    # predicted response vector
    y_pred = b[0] + b[1]*x

    # plotting the regression line
```

```
    plt.plot(x, y_pred, color = "g")

    # putting labels
    plt.xlabel('x')
    plt.ylabel('y')

    # function to show plot
    plt.show()

def main():
    # observations / data
    x = np.array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9])
    y = np.array([1, 3, 2, 5, 7, 8, 8, 9, 10, 12])

    # estimating coefficients
    b = estimate_coef(x, y)
    print("Estimated coefficients:\nb_0 = {}  \
        \nb_1 = {}".format(b[0], b[1]))

    # plotting regression line
    plot_regression_line(x, y, b)

if __name__ == "__main__":
    main()
```

Output:

```
Estimated coefficients:
b_0 = 1.2363636363636363
b_1 = 1.1696969696969697
```



Q3) Write a program to classify the given dataset using logistic regression and evaluate the model

```
import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import classification_report, accuracy_score, confusion_matrix

# Load iris dataset
from sklearn.datasets import load_iris
data = load_iris()
df = pd.DataFrame(data.data, columns=data.feature_names)
df['species'] = data.target

# Set target variable to 1 if species is 'setosa', and 0 otherwise
y = (df['species'] == 0).astype(int)
X = df.drop('species', axis=1)

# Split the dataset into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Create a logistic regression model
model = LogisticRegression(max_iter=1000)

# Train the model
model.fit(X_train, y_train)

# Predict values for the test set
y_pred = model.predict(X_test)

# Evaluate the model
print("Accuracy:", accuracy_score(y_test, y_pred))
```

```
print("\nClassification Report:\n", classification_report(y_test, y_pred))

print("\nConfusion Matrix:\n", confusion_matrix(y_test, y_pred))
```

Output:

```
Accuracy: 1.0

Classification Report:
                precision    recall  f1-score   support

             0       1.00      1.00      1.00        20
             1       1.00      1.00      1.00        10

    accuracy                           1.00        30
   macro avg       1.00      1.00      1.00        30
weighted avg       1.00      1.00      1.00        30


Confusion Matrix:
 [[20  0]
 [ 0 10]]
```

Q4) Write a program to implement support vector machine algorithm

```
# Import necessary libraries
from sklearn import datasets
from sklearn import svm
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score

# Load a sample dataset (e.g., the Iris dataset)
iris = datasets.load_iris()
X = iris.data
y = iris.target

# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)

# Create an SVM classifier (you can choose different kernel types, such as 'linear', 'rbf', etc.)
clf = svm.SVC(kernel='linear')

# Fit the classifier on the training data
clf.fit(X_train, y_train)

# Make predictions on the test data
y_pred = clf.predict(X_test)

# Calculate the accuracy of the classifier
accuracy = accuracy_score(y_test, y_pred)
print(f"Accuracy: {accuracy}")

# You can also get the support vectors and other parameters
print("Support Vectors:")
print(clf.support_vectors_)
```

```
print("Coefficients (weights):")
print(clf.coef_)
print("Intercepts:")
print(clf.intercept_)
```

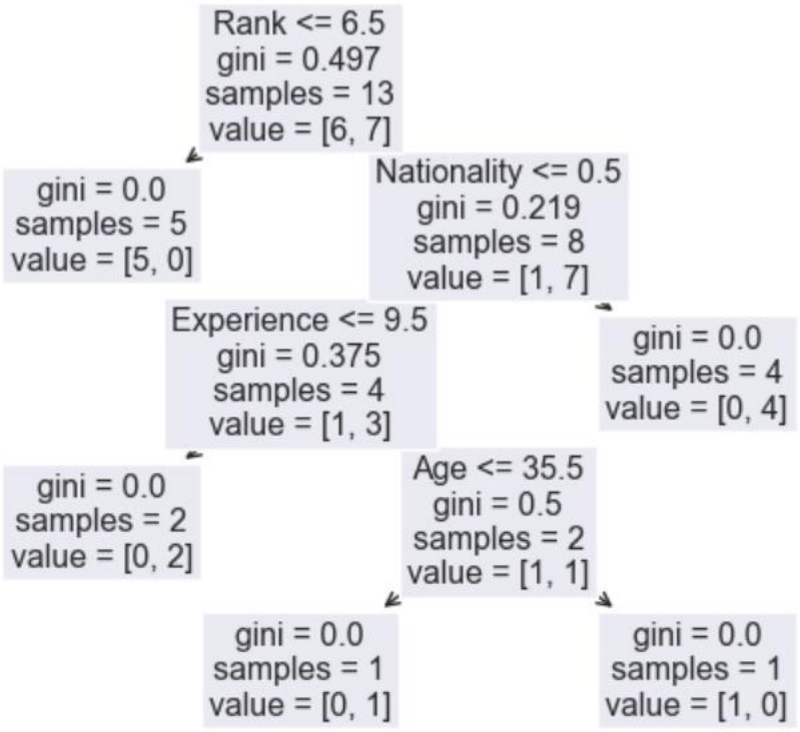
output:

```
Accuracy: 1.0
Support Vectors:
[[4.8 3.4 1.9 0.2]
 [5.1 3.3 1.7 0.5]
 [4.5 2.3 1.3 0.3]
 [5.6 3.  4.5 1.5]
 [5.4 3.  4.5 1.5]
 [6.7 3.  5.  1.7]
 [5.9 3.2 4.8 1.8]
 [5.1 2.5 3.  1.1]
 [6.  2.7 5.1 1.6]
 [6.3 2.5 4.9 1.5]
 [6.1 2.9 4.7 1.4]
 [6.5 2.8 4.6 1.5]
 [6.9 3.1 4.9 1.5]
 [6.3 2.3 4.4 1.3]
 [6.3 2.8 5.1 1.5]
 [6.3 2.7 4.9 1.8]
 [6.  3.  4.8 1.8]
 [6.  2.2 5.  1.5]
 [6.2 2.8 4.8 1.8]
 [6.5 3.  5.2 2. ]
 [7.2 3.  5.8 1.6]
 [5.6 2.8 4.9 2. ]
 [5.9 3.  5.1 1.8]
 [4.9 2.5 4.5 1.7]]
Coefficients (weights):
[[-0.04631136  0.52105578 -1.0030165  -0.46411816]
 [-0.00641373  0.17867392 -0.5389119  -0.29158729]
 [ 0.57613513  1.19215085 -2.03465638 -1.67923323]]
```

Q5) Write a program to implement Decision Tree model on the given dataset

```
import pandas
from sklearn import tree
from sklearn.tree import DecisionTreeClassifier
import matplotlib.pyplot as plt

df = pandas.read_csv(r"C:\Users\hp\Downloads\data.csv")

d = {'UK': 0, 'USA': 1, 'N': 2}
df['Nationality'] = df['Nationality'].map(d)
d = {'YES': 1, 'NO': 0}
df['Go'] = df['Go'].map(d)

features = ['Age', 'Experience', 'Rank', 'Nationality']

X = df[features]
y = df['Go']

dtree = DecisionTreeClassifier()
dtree = dtree.fit(X, y)

tree.plot_tree(dtree, feature_names=features)
```

output:


Rank <= 6.5
gini = 0.497
samples = 13
value = [6, 7]
gini = 0.0
samples = 5
value = [5, 0]
Nationality <= 0.5
gini = 0.219
samples = 8
value = [1, 7]
Experience <= 9.5
gini = 0.375
samples = 4
value = [1, 3]
gini = 0.0
samples = 4
value = [0, 4]
gini = 0.0
samples = 2
value = [0, 2]
Age <= 35.5
gini = 0.5
samples = 2
value = [1, 1]
gini = 0.0
samples = 1
value = [0, 1]
gini = 0.0
samples = 1
value = [1, 0]

Q6) Write a program to implement Bayesian classification on given dataset.

```
import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.naive_bayes import GaussianNB
from sklearn.metrics import classification_report, accuracy_score, confusion_matrix

# Load iris dataset
from sklearn.datasets import load_iris
data = load_iris()
df = pd.DataFrame(data.data, columns=data.feature_names)
df['species'] = data.target

X = df.drop('species', axis=1)
y = df['species']

# Split the dataset into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Create a Gaussian Naive Bayes classifier
model = GaussianNB()

# Train the model
model.fit(X_train, y_train)

# Predict values for the test set
y_pred = model.predict(X_test)

# Evaluate the model
print("Accuracy:", accuracy_score(y_test, y_pred))
print("\nClassification Report:\n", classification_report(y_test, y_pred))
```

```
print("\nConfusion Matrix:\n", confusion_matrix(y_test, y_pred))
```

Output:

```
Accuracy: 1.0

Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        10
           1       1.00      1.00      1.00         9
           2       1.00      1.00      1.00        11

    accuracy                           1.00        30
   macro avg       1.00      1.00      1.00        30
weighted avg       1.00      1.00      1.00        30


Confusion Matrix:
 [[10  0  0]
 [ 0  9  0]
 [ 0  0 11]]
```